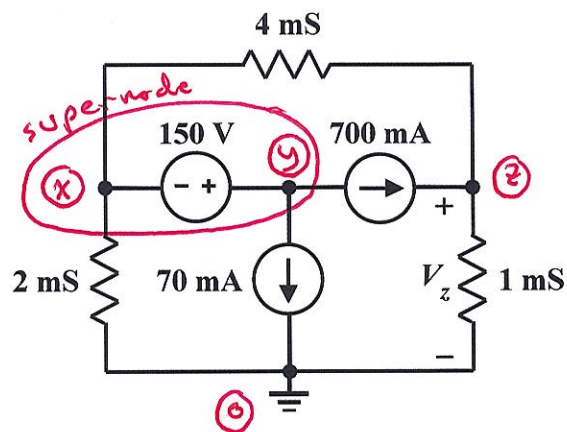


EE/EEET 2240  
**Homework Problem 013**

Develop node equations and express them in the matrix form discussed in class. Then, using a method of your choosing, solve for  $V_z$ .



$$V_y - V_x = 150 \quad (\text{constraint equation for the supernode})$$

$$0.004(V_x - V_z) + 0.002V_x + 0.07 + 0.7 = 0 \quad (\text{KCL for the supernode})$$

$$0.004(V_z - V_x) - 0.7 + 0.001V_z = 0 \quad (\text{KCL for node z})$$

In matrix form

$$\begin{bmatrix} -1 & 1 & 0 \\ 0.004 + 0.002 & 0 & -0.004 \\ -0.004 & 0 & 0.004 + 0.001 \end{bmatrix} \begin{bmatrix} V_x \\ V_y \\ V_z \end{bmatrix} = \begin{bmatrix} 150 \\ -0.7 - 0.07 \\ 0.7 \end{bmatrix}$$

$$\text{or} \begin{bmatrix} -1 & 1 & 0 \\ 0.006 & 0 & -0.004 \\ -0.004 & 0 & 0.005 \end{bmatrix} \begin{bmatrix} V_x \\ V_y \\ V_z \end{bmatrix} = \begin{bmatrix} 150 \\ -0.77 \\ 0.7 \end{bmatrix}$$

Solving yields  $V_z = 80 \text{ V}$